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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,283	10/24/2003	Nozomu Matsukawa	10873.1179USW1	4128
23552	7590	11/17/2004	EXAMINER	
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			JOLLEY, KIRSTEN	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/693,283

Applicant(s)

MATSUKAWA ET AL.

Examiner

Kirsten C Jolley

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/1/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/12/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restriction

1. Applicant's election of Group II, claims 12-14, in the reply filed on September 1, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Specification

2. The disclosure is objected to because of the following informalities: The specification should be amended to include the application's Continuation information in the first paragraph..
Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. (US 2002/0048127).

Fukuzawa et al. discloses a method for manufacturing a magnetoresistive element, the magnetoresistive element comprising a substrate and multi-layer film formed on the substrate

whereby the multi-layer film comprises a pair of ferromagnetic layers (CoFe pinned layer and CoFeNi free layer) and a non-magnetic layer sandwiched between the ferromagnetic layers (Cu non-magnetic intermediate layer) -- see the structure in the table in paragraph [0121]. The method of Fukuzawa et al. comprises the steps of: forming underlying film layers on the substrate; performing ion beam irradiation on the underlying film and directly on the NOL layer in an oxidizing chamber to form an oxide film (see paragraphs [0124] to [0151], and specifically [0148]); forming the remaining part of the multi-layer film including the ferromagnetic layers and the non-magnetic layer on the surface; and then heat-treating the substrate and the multi-layer film thereon at a temperature of 270 C for 10 hours (see Examples for heating step). It is noted that the heat-treating step is performed after the entire multi-layer film is formed on the substrate, however claim 12 does not require an order to the claimed steps and is broad enough to read on performing a single heat-treatment step once all of the multi-layer film has been formed since such a heat-treatment step would necessarily heat both the underlying layer and the multi-layer film as a whole. Additionally, it is the Examiner's position that the ion beam irradiation step of Fukuzawa et al. would necessarily decrease the surface roughness of the underlying film.

Fukuzawa et al. lacks a teaching of heat treating at a temperature of 400 C or above. However, it is well known that temperature is a result-effective variable and are dependent upon other variables such as the length of time of heating, the desired surface characteristics, the particular materials used, etc. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). It would have been obvious for one having ordinary

Art Unit: 1762

skill in the art to have determined the optimum heat treating temperature through routine experimentation in the absence of a showing of unexpected results.

As to claim 13, paragraph [0140] of Fukuzawa et al. teaches that the incident angle of ion beams may be as low as about 10 degrees, which falls within Applicant's claimed range.

As to claim 14, it is noted that the cap layer of Ta acts as an upper electrode, and the lowest underlying film of Ta acts as a lower electrode.

5. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. (US 2002/0048127) in view of Kawawake et al. (US 6,535,362).

The Fukuzawa et al. reference is applied for the reasons discussed above. In the case that Applicant intends to claim a heat treating step of the underlying film at 400 C or more occurring *before* the remainder of the multi-layer film is applied, Fukuzawa et al. is applied in view of Kawawake et al.

Kawawake et al. is similarly directed to a method of manufacturing a magnetoresistive element having a similar structure and materials to Fukuzawa et al. Kawawake et al. teaches in col. 13, lines 34-50, forming two underlying layers on a substrate, and then forming the remainder of multi-layers thereon, including a non-magnetic layer sandwiched by magnetic layers. Kawawake et al. teaches that after the underlying layers are formed, a heat treatment is performed at 200 C for about 30 minutes in order to obtain a smooth surface and improve the surface condition of the sample. It would have been obvious for one having ordinary skill in the art, upon seeing the reference of Kawawake et al. in combination with Fukuzawa et al., to have incorporated the underlying layer heat treating step in the process of Fukuzawa et al. with the

Art Unit: 1762

expectation of improving the surface condition and increasing surface smoothness. The test of obviousness is not express suggestion of the claimed invention in any or all references but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them. *In re Rosselet*, 347 F.2d 847, 146 USPQ 183 (CCPA 1965); *In re Hedges*, 783 F.2d 1038.

Claims 13 and 14 are rejected for the same reasons discussed above in section 4.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

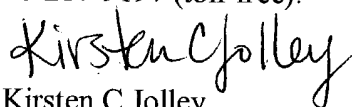
Tsunekawa et al. (US 2003/0049389) is cited for its teaching of performing ion beam irradiation on underlying layer(s) to flatten and clean the interfaces and provide a high MR ratio (see paragraphs [0054] to [0065], and paragraphs [0075] to [0078]).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck can be reached on 571-272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1762

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Kirsten C Jolley
Primary Examiner
Art Unit 1762

kcj